NHB 6000.1B
JUNE 1973
EDITION

REQUIREMENTS
FOR
PACKAGING, HANDLING, AND TRANSPORTATION FOR AERONAUTICAL AND SPACE SYSTEMS, EQUIPMENT AND ASSOCIATED COMPONENTS

AUG 1984
RECEIVED
NASA STI FACILITY
ACCESS DEPT.

(NASA-TM-85513) REQUIREMENTS FOR PACKAGING, HANDLING, AND TRANSPORTATION FOR AERONAUTICAL AND SPACE SYSTEMS, EQUIPMENT AND ASSOCIATED COMPONENTS (National Aeronautics and Space Administration) 25 p 00/12 21250

N84-75117

Unclas

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

N84-75117

REQUIREMENTS

FOR

PACKAGING, HANDLING, AND TRANSPORTATION FOR

AERONAUTICAL AND SPACE SYSTEMS EQUIPMENT

AND ASSOCIATED COMPONENTS

June 1973

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

PREFACE

Date: June 1973

In order to establish packaging, handling, and transportation practices adequate to maintain the reliability of NASA items and to achieve their damage-free delivery to the place and time of ultimate use, this publication:

1. Prescribes NASA's general requirements for packaging and certain Zero-Damages-On-Delivery Program (see Appendix A) aspects of the handling and transportation process.

2. Provides guidance for institutional packaging, handling, and transportation.

3. Establishes the suppliers' responsibilities for packaging engineering, preservation, packaging, packing, container marking, and Zero-Damages-On-Delivery Program transportation and handling requirements for program critical and high cost items.

4. Provides for supplier documentation of special design packaging procedures and of packaging, handling, and transportation for program critical and high cost items.

The provisions of this publication:

1. Are applicable to all NASA Installations.

2. Shall be invoked, in whole or in part, in procurements involving packaging, handling, and transportation for which such coverage is appropriate.

NASA Installations shall:

1. Amend, when timely and within cost constraints, existing contracts to invoke applicable requirements of this publication.
2. Utilize this publication for guidance for in-house packaging and Zero-Damages-On-Delivery Program handling and transportation.
3. Furnish copies of this publication in the quantities required to NASA contractors, subcontractors, and their vendors.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402 - Price 50 cents
Stock Number 3300-00526

NASA contractors shall invoke the requirements of this publication in subcontracts at every tier and purchase orders, as appropriate.

Questions concerning application of this publication to specific procurements shall be referred to the procuring NASA installation or its designated representative.

Copies of this publication are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

R. H. Curtin
Director, Office of Facilities

DISTRIBUTION:
SDL 1(SIQ)

TABLE OF CONTENTS

Par.		Page
	CHAPTER 1: BASIC PRINCIPLES	
100	Scope	1-1
101	Applicable Documents	1-2
102	Deviation and Waiver Requests	1-2
103	Policy	1-2
	CHAPTER 2: SUPPLIER PACKAGING REQUIREMENTS	
200	Selection of Packaging	2-1
201	Special Design Packaging	2-1
202	Packaging Data	2-1
203	Environmental Analysis	2-2
204	Packaging and Packing of Dangerous Materials	2-3
205	Kits (Parts and Modifications)	2-4
206	Weight and Cube	2-4
207	Reuseable Containers	2-4
208	Reuse of Packaging Materials and Containers	2-4
209	Disassembly	2-5
210	Matchmarking	2-5
211	Marking	2-5
212	Testing	2-6
	CHAPTER 3: SUPPLIER SPECIAL HANDLING AND TRANSPORTATION REQUIREMENTS	
300	Classes of Shipping and Handling	3-1
301	Packaging, Handling, and Transportation Record (PHTR) or Equivalent Information (EI)	3-1
302	Approval of PHTRs or EI	3-1
303	NASA Critical Item Label	3-1
304	Monitoring Devices for Class III Shipment	3-1
305	Transportation Planning	3-2
306	Restraining Systems	3-2
307	Surveillance of Transportation and Handling	3-2
	APPENDIXES	
	Appendix A: Definitions	a-1
	Appendix B: PHTR Preparation Instructions	b-1
	Appendix C: Applicable Documents	c-1

CHAPTER 1: BASIC PRINCIPLES

100 SCOPE

1. This publication defines general requirements for preservation, packaging, packing, marking, handling, transportation, and related data and documentation pertaining to all NASA procured software and hardware items. For the purposes of this publication the definitions in Appendix A shall apply.

2. a. Since the requirements of this publication are general guidelines, it does not supersede detailed NASA approved preservation, packaging, marking, handling, and transportation specifications or procedures to the extent they are in irreconcilable conflict; nor will this publication, or a requirement herein, be applicable if it is made expressly inapplicable. This publication may be used as part of, or as a supplement to, other approved specifications or procedures. For example, appropriate paragraphs of this publication may be incorporated by reference in a contract to spell out the obligations of the parties with respect to dangerous items, NASA Critical Item labeling, and special packaging, handling, and transportation data for program critical and high cost items.

   b. When this publication is to be incorporated contractually by reference, the procurement documents shall cite its title and date and, if desired, specific direction as follows:

      (1) Level of preservation and packaging and level of packing to be applied (see par. 200).

      (2) Listing of items requiring a Packaging, Handling, and Transportation Record (see par. 301).

      (3) Specific directions and authorization for application and use of monitoring devices (see par. 304).

3. Specifications and procedures for preservation, packaging, packing, marking, handling, transportation, and related data and documentation shall be compatible with this publication, except to the extent a deviation or waiver is approved in accordance with paragraph 102 herein. The mere citation of this publication or the mere incorporation by reference of this publication, or a part thereof, does not constitute compliance with any other applicable requirement that detailed or specific provisions be provided or stated in a particular document.

101 APPLICABLE DOCUMENTS

For documents referenced in this Handbook, see Appendix C.

102 DEVIATION AND WAIVER REQUESTS

Technical changes, deviations, or waivers sought by the contractor from any requirement of this publication which is included in a contract shall be requested from, and approved in writing by, the contracting officer or his designated NASA representative.

103 POLICY

1. GENERAL

Preservation, packaging, and packing shall comply with the basic NASA objective of achieving adequate protection of the contained items at minimum cost. However, exception is granted for items defined as program critical. While nonessential refinements should be avoided, the protection afforded these items must not be marginal.

2. PACKAGING, HANDLING & TRANSPORTATION RELIABILITY

Retention of item reliability shall be a major consideration in the development or selection of packaging, handling, and transportation approaches and throughout their implementation.

CHAPTER 2: SUPPLIER PACKAGING REQUIREMENTS

200 SELECTION OF PACKAGING

1. Levels of preservation and packaging and the levels of packing to be applied selectively are defined in Appendix A and are mandatory for use.

2. Selection of the levels of packaging and packing to be applied shall be the responsibility of the contractor, unless levels are specified by the procuring activity. Selection shall depend on the modes of transport, environmental control, the conditions and length of storage, and the anticipated requirements for redistribution. General guidance on standardized packaging approaches is available in DSAM 4145.2.

3. When Level A or Level B packaging and/or packing is selected, the protective process, materials, and containers shall be in accordance with the requirements of Standard MIL-STD-794. Guidance in selection is set forth in Appendix D to that document. National Aerospace Standards (ref. NAS 850 and 851) may be considered for Level B application where the standard meets the requirements of that level.

4. National Aerospace Standards (ref. NAS 850 and 851) merit consideration as guidance for accomplishment of Level C preservation and/or packing.

201 SPECIAL DESIGN PACKAGING

For those items possessing characteristics requiring special design packaging, the contractor shall develop the necessary designs, maintain packaging engineering data in sufficient detail to permit necessary review, implement the packaging specified therein, and prepare PHTR's or EI (see par. 302), as required.

202 PACKAGING DATA

Packaging data is required only for special design packaging and for those items for which PHTR's or EI (see par. 301) are required. If data is coded, the codes of MIL-STD-726 shall be used. Contractor packaging data forms may be used unless otherwise specified in the contract. Submission and approval shall be in accordance with the contract Data Requirements List, or as otherwise authorized in the contract or by written direction of the contracting officer. Approval of special design packaging data shall be obtained before any shipment of the item.

203 ENVIRONMENTAL ANALYSIS

1. The preservation, packaging, packing, and shipping techniques applied shall insure protection of the contained item against the natural and induced environments to which it may be subjected. Analysis of these hazards is essential prior to item design and development of the packaging and shipping techniques to be applied. The contractor shall insure that design engineering communicates item fragility and sensitivity data to packaging engineering, line packaging, and transportation personnel, as soon as feasible.

2. The contractor's packaging and transportation engineers and/or technicians should participate in equipment design efforts from the earliest stages. They should identify the ground handling, transport, and storage environment requirements, including protection from contingency or emergency environments where the hazard analysis indicates that facility/carrier protection is more practical, reliable, or cost effective than providing the same protection by packaging/packing design; prepare or identify testing programs; prepare packaging and transportation data for use in management's configuration documents; and perform such other functions in the design effort as may be necessary or proper.

3. The hazard analysis shall include trade-off considerations of the class of shipping and handling, probability of a loss, the cost and schedule impact of loss, and cost of facility/carrier protection against a contingency vs. cost of packaging/packing protection. The following phases shall be considered:

   a. In-plant storage, handling, and local transportation conditions and environments, both normally anticipated and contingency due to such emergencies as natural disasters, fires, spillage, and other accidents.

   b. In-transit modes, normal and contingency environments.

   c. Receiving, redistribution, handling, and storage conditions at the destination installation, range, test or launch facility including normal and contingency environments.

   General guidance on transportation environments is available in the following documents:

NASA - MSFC MR 1262	Manual, Design Criteria for Shock and Vibration (Transportation)
MIL-HDBK-304	Military Standardization Handbook, Package Cushioning Design (see also MIL-STD-810 and FED-TEST-METHOD-STD No. 101).

204 PACKAGING AND PACKING OF DANGEROUS MATERIALS

1. The packaging and packing of dangerous materials shall be in accordance with the General Provisions and the Safety Provisions of the contract and this publication. Applicable provisions of the Department of Transportation and Atomic Energy Commission Rules and Regulations for the Transportation of Explosives and Other Dangerous Articles (10 CFR Part 71, 14 CFR Part 103, 46 CFR Parts 146-149, 49 CFR 170-189), Tariff #12, Uniform Freight Classification Rules, the National Motor Freight Classification Rules, and rules and regulations of affected states and municipalities shall be complied with. All items offered for military airlift shall be processed in accordance with the requirements of AFM 71-4 (DSAM 4145.3). The contractor shall comply with the following:

   a. Properly prepare for shipment and secure solid propellant rocket motors in the propulsive state (see Tariff #19 listed under Appendix C).

   b. Protect against electro-static discharge. All items which are subject to ignition or detonation by electro-static discharge and items which are subject to degradation or damage therefrom (e.g., field-effect transistors or thin film resistors) and which are to be packaged in bags or wraps manufactured from MIL-F-22191, MIL-B-121, MIL-B-131, or other inadequately conductive plastic-coated barrier material, shall be wrapped individually in properly conductive material. A DD Form 1387-2 (ref. MIL-STD-129) bearing the following notation shall be affixed to each unit package:

      WARNING

      Contents subject to ignition, detonation, or degradation by electro-static discharge. Ground inner conductive wrapping before and during removal from this package.

2. Shrouds or covers used to protect unpackaged items which are subject to such ignition, detonation, or degradation also shall be of conductive material and shall be grounded during installation and removal of the shroud or cover and during transportation, receiving, and storage. When applied to such shrouds or covers, the form specified above shall bear the following notation:

   WARNING

   Ground this cover/shroud during installation and removal and during transportation, receiving, and storage.

3. The DD Forms 1387-2, annotated with the warnings prescribed above, do not take precedence over or serve in lieu of requirements specified in applicable tariffs.

4. Contractors are authorized to use commercially available conductive anti-static material or non-ferrous metallic shielding. The conductive anti-static material shall be made from a homogenous anti-static resin mix and shall have a maximum surface resistivity of

1×10^{12} ohms when tested per American Society for Testing Materials Method D257-66. It shall meet the contact corrosivity requirements of Specification MIL-F-22191.

5. Protect against radioactive materials. The packaging of radiation sources is governed by Department of Transportation Regulations (49 CFR Parts 170-189 and 14 CFR Part 103) and Atomic Energy Commission Regulation (10 CFR Part 71). Further guidance is contained in Specification MIL-E-17555, "Preparation for Delivery of Electronic and Electrical Equipment and Associated Repair Parts."

205 KITS (PARTS AND MODIFICATIONS)

Preservation, packaging, and packing of kits (parts and modifications) shall be in accordance with Standard MIL-STD-794, Appendix E. The supplier's standard packages and packs which meet the requirements for Level C (see Appendix A) may be used for shipments for immediate use.

206 WEIGHT AND CUBE

Accomplished packs shall be as simple as possible and of minimum tare weight and cube consistent with the protection required. Consolidation containers and pallets shall be used as proper to reduce multiple handling; however, items bearing the NASA critical item label (NASA Form 1368) shall not be commingled with noncritical items in any container. When the gross weight of the individual pack or consolidation container exceeds 100 pounds, or the cube exceeds 10 cubic feet, use of skids or pallets should be considered.

207 REUSEABLE CONTAINERS

Reuseable containers are those which are designed to provide adequate protection when reused for return shipments and/or throughout several shipping cycles or sequences. Reuseable containers shall be considered for all items which require periodic shipment to and return from repair activities and where adequate provisions to control the containers make reuse economical. The quantities of reuseable containers authorized shall be the minimum essential to meet anticipated pipeline needs. The contractor shall identify reuseable containers as to item, provide recoopering and repair as required and economically justified, and provide storage to insure their maintenance in serviceable condition and availability for use. The container specifications issued by the Air Transport Association (ATA) merit consideration for application to air shipping cycles. Information concerning these specifications is available from the ATA, 1000 Connecticut Ave., N.W., Washington, D.C. 20036.

208 REUSE OF PACKAGING MATERIALS AND CONTAINERS

Packaging materials and containers should be considered for reuse to maximum extent. The determination for reuse should be based on the quality condition of the material, the economics of storage and handling of the used material, and the incidence of usage anticipated.

209 DISASSEMBLY

Disassembly of major components to facilitate packaging or to provide more effective procedures is permissable if specified. Normally, components shall remain assembled, particularly where reassembly at destination would require special tools or equipment. Efforts should be made to secure assembly hardware to one of the mating parts where disassembly is accomplished.

210 MATCHMARKING

When necessary to facilitate reassembly or repackaging, removed parts shall be matchmarked. Tags used for matchmarking shall conform to Type A of Specification UU-T-81. Tags shall be oversprayed with a material conforming to Specification MIL-V-13811 and then secured to the item so as to offer no interference with reassembly.

211 MARKING

1. Marking of unit packages, intermediate packages, and exterior shipping containers shall be in accordance with the applicable requirements of Standard MIL-STD-129 and this publication.

2. Items designated as Class I, Class II, or Class III (see Appendix A) shall carry the NASA Critical Item Label (see par. 303). A label shall be affixed to each side, end, and top of the container; however, one label may be omitted if it interferes with other marking. Drums shall be marked with a label on the top and on opposite sides.

3. The shelf life terminal date and the preservation expiration date shall be marked on the unit and intermediate containers (ref. Federal Property Management Regulations, Subpar. 101-27.2).

4. DANGEROUS MATERIALS

   Marking and/or labeling of dangerous materials shall be in accordance with pertinent Federal, State, county, and municipal regulations (see Appendix C), with procedures cited within this publication, and with other applicable provisions of the contract. All interior packages and shipping containers for articles and materials classified as "Dangerous" or "Restricted" under provisions of Department of Transportation, Civil Aeronautics Board, U.S. Coast Guard Regulations, or DSAM 4145.3 (AFM 71-4, TM 38-250, NAVWEPS 15-03-500, MCO P4030.19) shall be marked--regardless of exemption for mode of transportation--with the proper shipping name of the item, with the flash point for all liquids having a flash point of 101 degree F. or below, and with the percentage of concentration of acids and corrosive liquids. In addition, the quantity of each dangerous or restricted material included in a container shall be noted adjacent to the shipping name of the item, e.g., Acetic Acid (80% concentration)--one quart. This marking should provide the net weight of explosives contained in each interior and shipping container.

212 TESTING

1. Testing of packages, packaging methods, materials, and packs shall be in accordance with the requirements of the specifications or standards selected. Where such specific guidance is not provided, tests shall be performed as specified in Standard MIL-STD-794, Appendix C.

2. All special design packaging documentation shall include appropriate procedures for testing. The contractor shall utilize standardized packaging testing techniques (i.e., MIL-P-116 and FED TEST METHOD STANDARD-101) for guidance in development of testing requirements and criteria. The contractor shall insure that such special testing data is included in quality assurance plans, procedures, test plans, specifications, and reports, as required by the contract.

3. Preproduction tests are designed to prove the adequacy of the preservation, blocking, bracing, and cushioning for protecting the item (ref. MIL-STD-794, Appendix C). The contractor shall be responsible for designation of packages and packs requiring preproduction tests. Testing normally should be considered for special design packages (see par. 201) only. Preproduction testing will not be required when:

   a. The contractor has data or other evidence to indicate that prior successful preproduction tests were conducted and are accepted by the contracting officer as equivalent to those now proposed.

   b. The packaged item has been subjected to similar tests as a part of other testing programs.

   c. The container for a specific item of equipment is developed under an end item specification--with engineering and testing approval through configuration management procedures and reviews.

   d. Detailed packaging instructions are imposed by the procuring activity.

CHAPTER 3: SUPPLIER HANDLING AND TRANSPORTATION REQUIREMENTS

300 CLASSES OF SHIPPING AND HANDLING

Classes of shipping and handling are defined in Appendix A and shall apply to equipment, components, and associated parts.

301 PACKAGING, HANDLING, AND TRANSPORTATION RECORD (PHTR)

1. A Packaging, Handling, and Transportation Record (PHTR) or Equivalent Information (EI) shall be developed from engineering data (see par. 203) and packaging data (see par. 202) for each Class I (program critical and/or high cost) item (see Figure 1).

2. Procedures shall be effected to ensure that changes in packaging data and handling and transportation methods and criteria are reflected in amended or revised PHTRs or EI in a timely manner. The PHTR or EI, when reproduced, shall not be altered in size or content.

302 APPROVAL OF PHTRs OR EI

The PHTR or EI shall be submitted and approved as directed by the Data Requirements List. Approval of the PHTR or EI normally will be obtained from the transportation officer of the procuring location and the designated representative of the procuring project/center. Shipment shall not be effected without this approval. Procedures for interim approval in emergency cases shall be as authorized by the procuring activity.

303 NASA CRITICAL ITEM LABEL

The contractor shall insure that the NASA critical item label is prominently displayed on the exterior of all Class I, Class II and Class III interior packages and exterior shipping containers to alert all shipping and handling personnel to the criticality of the item to the NASA effort. Its use will assure special handling by carrier, receiving and storage personnel who have been oriented in the Zero-Damages-On-Delivery Program. This label may be obtained from the procuring activity in the following sizes:

1. NASA Form 1368	4 by 8 inches
2. NASA Form 1368A	3 by 6 inches
3. NASA Form 1368B	2 by 3 1/2 inches

304 MONITORING DEVICES FOR CLASS III SHIPMENT

Where application of a monitoring device has been recommended and its use authorized, such device shall be of a type and nature which will detect or provide a permanent indication that the packaged contents

have been subjected to adverse conditions (such as temperature, shock, or moisture) that could impair their ability to perform their intended function in a satisfactory manner. Monitoring devices shall be installed in a manner that will permit their observation and inspection with a minimum of assembly or dissasembly of the container. The location of the device shall be marked prominently on the exterior container.

305 TRANSPORTATION PLANNING

1. PLANNING

Modes of shipment shall be in accordance with transportation or logistics support plans implemented under the contract. When such direction is not available, the mode that shall be employed is one that provides reliable protection to the critical and high cost items involved and takes into account the time schedule and cost. The contractor shall establish and implement procedures for the control of premium transportation, e.g., special mission airlift, chartered aircraft, exclusive use of carrier equipment, unusual and excessive accessorial charges, etc.

2. DATA

When requested, transportation data for items requiring special design transportation and/or handling equipment or special commercial carrier or Government services, shall be submitted in accordance with the contract Data Requirements List (DRL). Contractors's format may be used unless otherwise specified. Approval shall be as specified on the DRL or as otherwise authorized in the contract or by written direction of the contracting officer. Approval shall be obtained before any shipment of the item.

306 RESTRAINING SYSTEMS

For highway, air, rail, and marine shipments, items in their shipping configuration and skidded or wheeled equipment shall be provided with tiedown and/or lifting provisions commensurate with their size and weight. Additional safety measures may be required and should be considered during the design of the restraining system because of peculiarities of the cargo, carrier safety considerations, or accident effects, specially where dangerous materials are involved.

307 SURVEILLANCE OF TRANSPORTATION AND HANDLING

The contractor is responsible for maintaining surveillance over each class of shipment and shall insure neccesary coordination with the transportation officer of the procuring activity, with carrier representatives, and with transportation officials at destination to accomplish the following:

1. Insure that inspection has been performed prior to shipment--including verification of compliance with PHTR's, or EI.

2. Insure the preferred utilization of carriers participating in the Zero-Damages-On-Delivery Program and certified by NASA Headquarters as qualified to meet program standards.

3. Insure that NASA critical item labels have been affixed to the shipping containers for Class I, II, and III items.

4. Insure that shipment routing or routing requests include special handling and monitoring instructions, as required, and provide necessary notification to in-route transfer agents.

5. Provide advance shipping and handling information to all responsible activities, as required.

6. Arrange for escort or courier services, as required.

7. Insure compliance with transportation, preservation, packaging, handling, and logistics plans.

8. Provide PHTRs or EI for program critical and high cost items to destination transportation officers to insure proper receiving, damage-free handling and storage, and essential protection through redistribution up to final use.

9. Insure for Class IV items the most advantageous commercial transportation practice which is in the best interest of the Government.

10. Provide transportation officers originating shipments and the procuring installation transportation officers with immediate advice concerning losses in transit or handling, due to inadequate packaging protection or failure to effect prescribed transportation and handling.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PACKAGING, HANDLING TRANSPORTATION RECORD (PHTR)

PAGE 1 OF 1 PAGES

1. RECORD SERIAL NO.: SC-0001	2. DATE: 1-3-69	3. NOMENCLATURE: Solid Rocket Motor	4. PART NO.: NM-12345A	5. FEDERAL STOCK NUMBER: N/A
6. VENDOR/CONTRACTOR NAME: The NM Co.		7. CONTRACT NO.: SC-P-123	8. PURCHASE ORDER NO.: N/A	9. DRAWING NO.

PRESERVATION, PACKAGING, AND PACKING

10. LEVELS: [X] a. A [ ] b. B [ ] c. C [ ] d. OTHER

11. ITEM DESCRIPTION	a. LENGTH	b. WIDTH	c. HEIGHT
	120	85	42
	d. NET WEIGHT	e. MATERIAL	f. FINISH
	500	Note 1	Note 2

OPTION 1 (Spaces 12-17)

12. PRESERVATION: [X] a. METHOD PER MIL-P-116 IIa-3 Spot humidity ind. [ ] b. OTHER Special clean

13. QUANTITY PER UNIT PACK: 1 each

14. UNIT WRAPS: MIL-M-9950

15. CUSHIONING - DUNNAGE: See Block 19, Note 2 — a. THICKNESS — b. TYPE

OR

16. UNIT CONTAINER: a. MATERIAL: See Block 12 — b. TYPE

17. INTERMEDIATE CONTAINER: N/A — a. MATERIAL — b. TYPE — c. UNIT QUANTITY

18. OPTION 2 CODE PER MIL-STD-726

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

SHIPPING DETAILS

19. CONTAINER TYPE
(1) Slotted angle crate - MIL-C-9897;
(2) Cushioning, blocking, and bracing IAW DWG -- NMI 12345A1;
(3) Anti-static protection & grounding required.

REUSEABLE - [ ] YES [ ] NO

20. SHIPPING CONTAINER DATA (If additional space is required, use item 27)

LENGTH a. FT.	LENGTH b. IN.	WIDTH c. FT.	WIDTH d. IN.	DEPTH e. FT.	DEPTH f. IN.	g. CUBE (Cu. ft.)	h. GROSS WEIGHT
10	6	7	6	4	6	354	1000

21. MARKING: [X] a. PER MIL-STD-129 Class C Explosives [X] b. OTHER See Note 3

22. SHELF LIFE EXPIRATION DATE: 1-3-71

23. CLASS OF SHIPMENT: I

24. HANDLING TRANSPORTATION CONSTRAINTS

TYPE OF CONSTRAINT	CRITICAL LEVEL	MONITORING METHOD
a. CONTAMINATION	Note 4	
b. HUMIDITY	50%	See Block 12
c. TEMPERATURE	25-110°	See Note 5
d. PRESSURE		
e. VIBRATION (Shock, etc.)	Note 6	
f. FLASHPOINT		
g. OTHER		

25. SPECIAL HANDLING INSTRUCTIONS (Specify details where applicable)
[X] a. INPLANT MOVEMENT - Special dolly
[ ] b. INPLANT STORAGE
[X] c. TRANSPORTATION (Including P&D) - See Trans. Plan-NM-T-123
[X] d. ONSITE STORAGE - Inside storage
[X] e. ONSITE MOVEMENT - Shock mitigated -- see Note 6
[X] f. OTHER - Ground during transport

26. MODE OF SHIPPING	a. PRIMARY	b. ALTERNATE
	Air	Air-ride Van

27. ADDITIONAL NOTES, SKETCHES, SPECIAL INSTRUCTIONS, QUALITY CONTROL REQUIREMENTS (Attach supplemental sheets as required)
1. Stainless Steel, aluminum, fiberglass
2. Critical Fragility - no dents
3. NASA Form 1368; Grounding directions for Antistatic Barrier (DD Form 1387-2).
4. Special clean IAW MSFC-STD-164
5. Exposure outside limits - 8 hours
6. Shock criteria - longitudinal 1.0g; lateral .5g; vertical .5g.

28. PACKAGING DATA SUBMITTED BY	29. CHECKED BY

30. PREPARING ACTIVITY APPROVAL (Signature)	31. TRANSPORTATION OFFICIAL (Signature)

32. PROCURING ACTIVITY APPROVAL (Signature)

33. LOCATION	34. TEL. NO.	35. DATE
SC		2-5-69

NASA FORM 1426 SEP 69

GPO 881-322

Figure 1

APPENDIX A: DEFINITIONS

Classes of Shipping and Handling: Class I, Class II, Class III, or Class IV shipping and handling categories are defined as follows:

Class I: Program critical and high cost items which, in the event of loss, damage, or delay in shipment, would seriously affect the program. (See "Program Critical Item" this Appendix.)

Class II: Delicate or sensitive items not covered by Class I or Class III. These items are those that are damaged readily by improper handling.

Class III: Items requiring special handling and monitoring. Class III items require a courier or monitoring instrumentation.

Class IV: Those items that can be transported or handled through the use of normal commercial transportation.

Data Requirements Descriptions (DRD): Technical and management information specifications which provide instructions and/or formats for the preparation and presentation of technical data and reports required by the contract Data Requirements List.

Data Requirements List (DRL): A listing of the technical information and reports required for a contract including submittal and approval criteria and instruction.

High Cost Item: An item costing $25,000 or more.

Intermediate Package: Container which contains two or more unit packages of identical items.

Levels of Preservation and Packaging are defined as follows:

Level A: Preservation and packaging which will afford adequate protection against corrosion, deterioration, and physical damage during shipment, handling, indeterminate storage, and worldwide redistribution.

Level B: Preservation and packaging which will afford adequate protection against corrosion, deterioration, and physical damage during multiple reshipment, handling, and known storage conditions for period normally not exceeding one year.

Level C: Preservation and packaging which will afford adequate protection against corrosion, deterioration, and damage during shipment from supply source to the first receiving activity for immediate use.

Levels of Packing are defined as follows:

Level A: Packing which will afford adequate protection during shipment, handling, indeterminate storage, and worldwide redistribution.

Level B: Packing which will afford adequate protection against multiple domestic shipments and covered storage.

Level C: Packing which will afford protection against damage during direct shipment from the supply source to the first receiving activity for immediate use.

Marking: The application or use of marks, symbols, and addresses for purposes of guiding or directing the safe handling and shipping of packaged items.

NASA Critical Item Label: A standardized, distinctive label prominently displayed on the exterior of all Class I, Class II, and Class III interior packages and exterior shipping containers. The purpose of the label is to alert all shipping and handling personnel to the criticality of the item to the space effort. (See par. 303).

Packaging: Application or use of adequate protective measures to prevent damage from physical hazards (including probabilistic considerations of externally caused fires, external spills, unusually environmental conditions, transportation accidents, etc.) during transportation and storage, including application of packages and wraps, cushioning, and complete identification marking of unit and intermediate containers. It is used also in the complete operation--preservation, packaging, packing, and marking.

Packaging, Handling, and Transportation Record (PHTR): NASA Form 1426 (Figure 1) defines the specific levels and means of preservation, packaging, packing, marking, handling, and shipping instructions for program critical and high cost items.

Packing: The final placement of items or packages in exterior shipping containers or other media, including necessary blocking, bracing, cushioning, weatherproofing, exterior strapping, and marking.

Preservation: Application or use of adequate protective measures to prevent deterioration from environmental hazards, including, as applicable, the use of appropriate cleaning and drying methods, preservatives, and wrapping for protection from chemical danger.

Program Critical Item: An item of equipment or a part for which the lack of immediate issue on-call at the demand source would affect adversely program/project schedules, safety, or reliability.

Special Design Packaging: That packaging which is to be used for those items possessing characteristics which require specially designed packaging, cushioning, blocking and bracing, and/or specially designed containers to provide the necessary protection. The methods or techniques of application are so complex or unusual that standard descriptions are inadequate, and

additional data is required to describe and/or to depict them and require the approval of a packaging engineer/specialist. Special design packaging includes items which present:

1. Special handling, packaging, or transportation problems because of restrictive shock or vibration characteristics; or

2. A requirement for special environmental control; or

3. A requirement for maintenance within special or critical pressure or temperature limits; or

4. A requirement for specialized container design, special handling devices, fixtures, or monitoring devices; or

5. A requirement to meet special conditions and durations of storage.

Transportation Official: The official assigned the central responsibilities for implementing the shipping and handling functions.

Unit Package: The first tie, wrap, or container applied to a single item or several items of the same identifying number or nomenclature or a group of items included under one identifying number or nomenclature which involves a complete or identifiable package.

Zero-Damages-On-Delivery (ZDOD) Program: A program to provide an extra degree of care in the packaging, transportation, and handling of program critical and high cost items throughout production, in-plant handling, shipment, receipt, redistribution, and destination-site operations. The Program applies to contractor operations in-plant and at test or launch sites, to commercial or government carriage, and to NASA's in-house transportation, handling, and storage.

APPENDIX B: DEFINITIONS AND INSTRUCTIONS FOR PACKAGING, HANDLING, AND TRANSPORTATION RECORD (PHTR) PREPARATION

The following definitions and instructions identified by space numbers apply to preparation of the PHTR shown as Figure 1.

1. Record Serial Number -- The control number assigned by the activity that prepares the PHTR/EI.

2. Date -- The calendar date the PHTR/EI was originated.

3. Nomenclature -- Nomenclature as it appears on the part, drawing, or definition.

4. Part Number -- The number that identifies the part.

5. Federal Stock Number (FSN) -- The eleven digit number assigned to the item (if an FSN exists).

6. Vendor/Contractor Name -- The name of the organization that manufactures the item.

7. Contract Number -- The number assigned to the contract.

8. Purchase Order Number -- The procuring activity purchase order number (if handled by purchase order).

9. Drawing Number -- The engineering drawing number of the item being packaged.

10. Levels of Preservation, Packaging, and Packing -- The applicable level of preservation, packaging, and packing as described in this Handbook. Special packaging (other than levels specified in this Handbook) is indicated by checking the "Other" box and specifying special requirements in space provided. An "X" inserted in or beside the appropriate box shall indicate the level of preservation and packaging; an "O" shall indicate the level of packing.

11. Item Description -- The length, width, height, net weight, material and surface finish of the item to be packaged.

12. Option 1, Preservation, Packaging, and Packing -- Method of preservation, packaging, and packing conforming either to a specified method described in Specification MIL-P-116; appropriate industrial/commericial standard, e.g., Aerospace Standard NAS-850; or special method as described.

13. Quantity Per Unit Container -- The number of units (e.g., each, set, gallon, etc.) to be packaged in the first or unit container.

14. Unit Wraps -- Usually the first or intimate protection given to the item. Use approved specifications or other procuring activity approved material.

15. Cushioning/Dunnage -- The cushioning/dunnage type and applicable specification or other description.

16. Unit Container -- The type, material, specification, or description (e.g., wrap, bag, box, etc.).

17. Intermediate Container -- The number of unit containers to be packed in one intermediate container and the type of intermediate container used. The use of intermediate containers is not mandatory.

18. Option 2, Preservation, Packaging, and Packing -- This is an Electronic Data Processing (EDP) application of blocks 12 through 17 above. The applicable code of Standard MIL-STD-726 should be entered if this option is used.

19. Shipping Container Type -- The exterior pack that contains the intermediate or unit container and provides protection to the items during shipment. The shipping container may be under some conditions, the unit container.

20. Shipping Container Data -- Show length, width, and depth to the nearest inch, cube to the nearest cubic foot, and gross weight to the nearest pound.

21. Marking -- Indicate in appropriate box or boxes whether MIL-STD-129 and/or other marking is applicable. Additional space is provided under item 27 if special marking information is required.

22. Shelf Life -- The expiration date of shelf life of the item. If more than one item, and dates differ, use earliest date.

23. Class of Shipment -- The class of shipment as specified in this Handbook.

24. Handling, Transportation Constraints, Levels, and Monitoring Methods -- The constraints (special controls) levied on the item of supply that requires special monitoring (such as shock forces, temperature, flashpoint, etc.). State the number, location, and type of monitoring device and if instrumentation is required. Additional space is provided under item 27 if special handling information is required.

25. Special Handling Instructions -- The special handling instructions, including handling in-plant, at receiving stations, during on-site storage, in transit, and at destination. If special unpacking procedures are required, they shall be reflected in this block. Also note in this block if a special protective container is required in addition to that provided by the item pack.

26. Mode of Shipment -- The primary and alternate, if possible, modes of shipment.

27. Additional Notes -- Attach additional sheets, as required, covering detailed instructions, diagrams, quality assurance requirements and drawings that cannot be shown in the space provided.

28. Packaging Data Submitted By -- The legible signature of the originator of the PHTR. This is normally a contractor packaging engineer who submits the data.

29. Checked By -- The legible signature of the individual who verifies the PHTR/EI.

30. Preparing Activity Approval Signature -- The legible signature of the individual responsible for final approval of the data developed for the item covered by the PHTR. This signature verifies approval by the preparing activity organizations responsible for design, preservation, packaging, packing, shipping, and handling.

31. Transportation Official Signature -- The legible signature of the procuring center transportation official.

32. Procuring Activity Approval Signature -- The legible signature of the procuring activity representative who is responsible for the final approval of the PHTR.

33. Location -- The physical location of the individual shown in item 32.

34. Telephone -- The telephone number of the individual shown in item 32.

35. Date -- The calendar date the PHTR/EI is approved by the individual shown in item 32.

APPENDIX C: APPLICABLE DOCUMENTS

The documents listed in this Appendix form a part of this publication to the extent specified. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposals shall apply. Unless otherwise indicated, copies may be obtained through or as directed by the contracting officer.

1. STANDARDS

Federal Test Method Standard No. 101	Preservation, Packaging, and Packing Materials; Test Procedures
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-726	Packaging Requirements Code
MIL-STD-794	Parts and Equipment, Procedures for Packaging and Packing of
MIL-STD-810	Environmental Test Methods for Aerospace and Ground Equipment
National Aerospace Standard 850	General Packaging Standard
National Aerospace Standard 851	General Packaging Standard Commodity Index

These NAS Standards are available from National Standards Association, 1321 Fourteenth Street, N.W., Washington, D.C. 20005.

2. SPECIFICATIONS

UU-T-81	Tags, Shipping, and Stock
MIL-P-116	Preservation, Methods of
MIL-B-121	Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-B-131	Barrier Material, Water, Vaporproof, Flexible
MIL-P-9024	Packaging, Materials Handling and Transportability, System and System Segments, General Specification for

MIL-V-13811	Varnish, Waterproofing, Electrical, Ignition
MIL-F-22191	Films, Transparent, Flexible, Heat Sealable, for Packaging Applications

3. HANDBOOKS

DSAM 4145.2, TM 38-230, NAVEXOS P938, AFP 71-1-6, MCO P4030.21 -- Preservation, Packaging, and Packing of Military Supplies.

DSAM 4145.3, TM 38-250, NAVWEPS 15-03-500, MCO P4030.19, AFM 71-4 -- Packaging and Handling of Dangerous Materials for Transportation by Military Aircraft.

MIL-HDBK-304 -- Military Standardization Handbook, Package Cushioning Design

4. NASA PUBLICATIONS

NASA-MSFC MR1262	Manual, Design Criteria for Shock and Vibration (Transportation)
NMI 6410.1	Packaging, Preservation, and Marking (Policy and Responsibilities)

5. OTHER PUBLICATIONS

Soley for the purpose of convenience, the following citations are provided to some of the regulations, classifications, and tariffs that may be applicable. Other Federal, State, and local Government laws or regulations may be applicable also.

Code of Federal Regulations

14 CFR Part 103 46 CFR Parts 146-149 49 CFR Parts 170-189	Department of Transportation Hazardous Materials Regulations
10 CFR Part 71	Atomic Energy Commission Radioactive Materials Regulations

Copies of these regulations are available from the Superintendant of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

Uniform Freight Classification #11 (and revisions)-(Application for copies should be addressed to the National Motor Freight Traffic Association, Inc., J. D. Sherson, Tariff Publishing Officer, Room 1106, 2225 Riverside Plaza, Chicago, IL 60600.)

Bullinger's Postal and Shippers' Guide for the United States and Canada-(Application for copies and supplements should be addressed to Bullinger's Guides, Inc., P.O. Box 501, 63 Woodland Avenue, Westwood, NJ 07675.) Orders are rented on an annual basis.

Official Air Transport Restricted Article Tariff #6-D (or revisions thereof)-(Application for copies should be addressed to Air Traffic Conference of America, 1000 Connecticut Avenue, NW, Washington, DC 20036.)

Tariff #25 - Department of Transportation Regulations for Transportation of hazardous articles by Motor, Rail, and Water including specifications for shipping containers (Motor Carriers, Explosives and Dangerous Tariff, R. M. Graziano's Agent, American Railroad Operation and Maintenance, Bureau of Explosives, American Railroad Building, Washington, DC 20036.)

CG #108 - Coast Guard Rules and Regulations for Military Explosives and Hazardous Munitions (Application for copies should be addressed to Commandant (CMC), U.S. Coast Guard, Washington, DC 20591.)

☆ U.S. GOVERNMENT PRINTING OFFICE : 1973 O—509-238